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IS 9243-2 (1987): Method of test for wrist watches, Part 2: Shock resistant [PGD 23: Horology]

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UDC 681·114·8-752 : 620·1

IS : 9243 (Part 2) - 1987

Indian Standard

(Reaffirmed - 2012)

METHODS OF TEST FOR WRIST WATCHES

PART 2 SHOCK-RESISTANT

(First Revision)

1. Scope — Lays down the shock-resistant properties of wrist watches for general use and specifies the methods of test for the verification of these properties.

1.1 This standard is meant for product confirmation test and not for checking each individual watch in production since the test may cause alteration in the rate of the watch, necessitating readjustment even if the minimum requirements have been satisfied.

2. Definition

2.1 *Shock Resistant* — A wrist watch bearing the mention 'shock-resistant' or any other similar term shall comply with the minimum requirements described under **4**.

2.2 *Rate* — Denotes the instantaneous time keeping accuracy, that is, likely gain or loss over a duration of 24 hours of the watch, measured with the use of a chrone-comparator (timing machine).

2.3 *Residual Effect* — The greatest difference of rates observed, respectively, in the three positions described in **3.3.1** and **3.3.4**.

3. Method of Testing

3.1 *Conditions*

3.1.1 A wrist watch shall be tested without the bracelet, unless the latter forms an integral part of the watch.

3.1.2 During the whole test period, the ambient temperature shall be between 18 and 25°C and shall not vary by more than 2°C.

3.2 *Apparatus*

3.2.1 The device used to produce the shock shall be a pendulum impact tester (*see* Appendix A) or any other apparatus the construction of which correspond to the characteristics described in Appendix B.

3.3 *Operations*

3.3.1 *Determination of rate before shocks*

3.3.1.1 *Mechanical watches* — Sixty minute after maximum winding, the rate shall be successively observed during at least one minute in each of the DD (dial down), 6 U (hour six up) and 9 U (hour nine up) position.

3.3.1.2 *Quartz watches* — After 120 minutes of function, the rate shall be observed in DU (dial up) or DD (dial down) position.

3.3.2 *First shock* — The shock shall be directed against the case and parallel to the plane of the watch, on the 9 O' clock side (*see* Fig. 1).

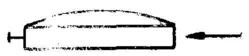

FIG. 1

Hydrology Sectional Committee, EDC 82 [Ref : Doc : EDC 82 (4291)]

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3.3.3 *Second shock* — The shock shall be directed against the crystal (glass), perpendicularly to the plane of the watch (*see* Fig. 2).

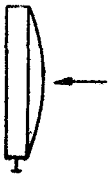

FIG. 2

3.3.4 *Determination of rate after shocks*

3.3.4.1 *Mechanical watches* — Five minutes after the second shock, the rate shall be successively observed during at least one minute in each of the DD, 6U and 9U positions.

3.3.4.2 *Quartz watches* — Five minute after the second shock, the rate shall be observed in position DU or DD.

4. Minimum Requirements

4.1 The watch meets the minimum requirements, if:

a) it shall not stop after the shocks;

b) the residual effect shall not exceed 60 seconds per day for all watches except quartz watches for which the limit shall be 2 seconds per day; and

c) an examination of the watch shall not reveal any apparent deterioration affecting its performance or its appearance (for example, bent or displaced hands, altered display, impaired automatic device or calendar, cracked glass, bent lugs, bent or broken crown or damaged push-button, etc).

5. Marking — The wrist watches, which satisfy the minimum requirements laid down in **4**, may be marked with the term 'shock-resistant'.

APPENDIX A

(*Clause* 3.2.1)

CHARACTERISTICS SPECIFIC TO PENDULUM IMPACT TESTERS

A-1. If the device is a pendulum impact tester, it shall be made and used according to the following data.

A-1.1 *Starting Position of Hammer* — The angle α, giving the starting position of the hammer as shown below, may be calculated by means of the formula:

$$\cos\frac{\alpha}{2} = \frac{VT}{4\pi r}$$

where

$V = 4{\cdot}43$ m/s,

T = period expressed in seconds, and

r = radius expressed in metres.

The values T and r shall be determined by the manufacturer of the pendulum impact tester (*see* Fig. 3).

The period T represents the duration, expressed in seconds, of one oscillation of low amplitude (*see* Fig. 4).

A-1.2 *Adequate Working Check* — The check shall be executed with the hammer freely oscillating.

A-1.2.1 The manufacturer of the pendulum impact tester shall state the minimum height h corresponding to the ascent of the hammer to position B after starting in position A (horizontal) as shown in Fig. 5. If this height h is not reached, the working of the pendulum impact tester shall be checked.

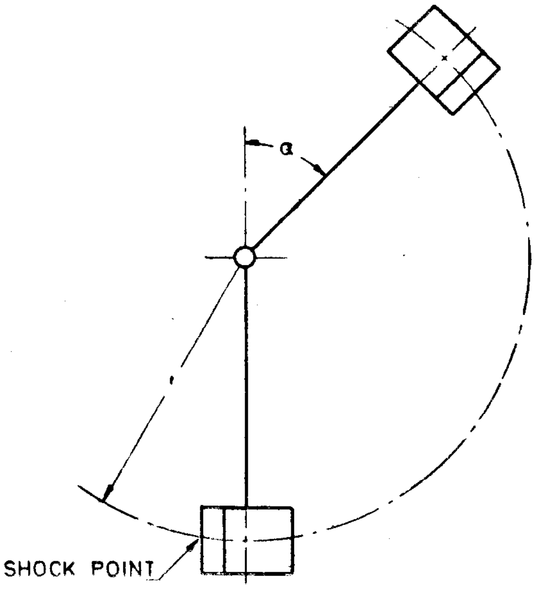

FIG. 3

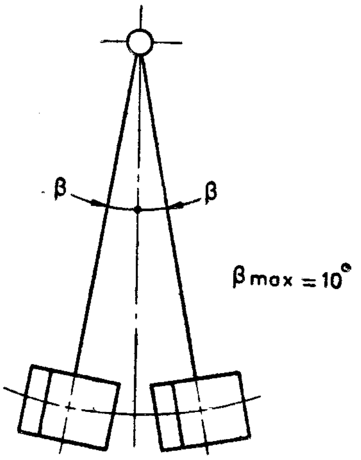

FIG. 4

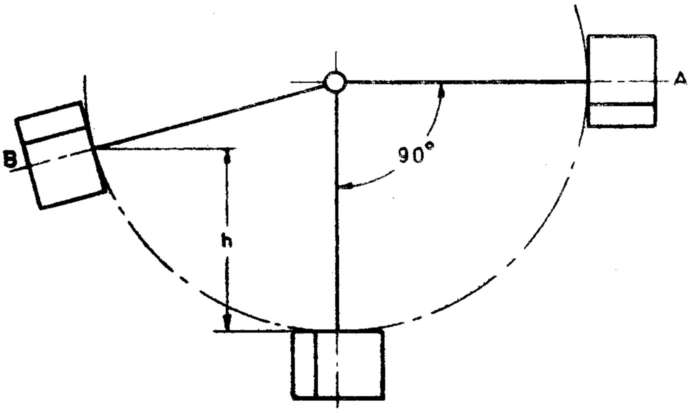

FIG. 5

A-1.3 *Position of Watch*

A-1.3.1 The watch shall be laid freely on its horizontal support to be subjected to the two shocks indicated in **3.2.2** and **3.2.3**.

A-1.3.2 The position occupied by the watch on this support shall be such that the shock is produced at the exact instant when the pendulum passes through its point of stable equilibrium.

A-1.4 *Conditions of Shock*

A-1.4.1 At the moment of impact, the face of the sabot entering into contact with the watch shall be vertical and parallel to the vertical plane containing the axis of oscillation of the pendulum.

A-1.4.2 Periodically, the polytetrafluoroethylene plate striking the watch shall be shifted or ground flat.

APPENDIX B

(*Clause* 3.2.1)

CHARACTERISTICS COMMON TO ALL TYPES OF APPARATUS

B-1. Apparatus described are designed to simulate the shock received by a watch on falling accidentally from a height of one metre on to a horizontal hardwood surface. The following characteristics shall be identical for all types of apparatus.

B-1.1 *Impact Speed* — The impact speed corresponding to an unimpeded fall from a height of one metre shall be 4·43 m/s.

B-1.2 *Sabot* — The sabot striking the watch shall be made of polytetrafluoroethylene.

B-1.2.1 The total mass of the hammer and sabot shall be 3 kg (minimum).

B-1.2.2 The dimensions of the sabot shall be as shown in Fig. 6.

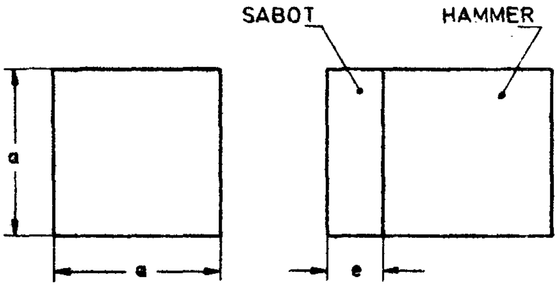

FIG. 6
$a \geqslant 30$ mm
$e \geqslant 10$ mm

B-1.3 *Arresting Device Applied to the Watch After Shock* — After the shock, the watch travels freely along its trajectory and is gradually arrested by a device which shall not inflict any further shock.

EXPLANATORY NOTE

Method of tests for determining the antimagnetic and water resistant properties of watch have been dealt with separately.

This standard was first issued in 1979. In this revision, requirements of quartz watches have also been included. In the preparation of this standard, assistance has been derived from the following:

ISO 1413-1984 Shock-resistant watches — Impact test. International Organization for Standardization.

NFS 81-525-1974 Shock-resistant wrist watches. l' Association Francaise De Normalisation.

DIN 8303-1972 Shock protection of watches; definition, requirements and testing. Deutsches Institut für Normung.

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